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Regional Science Advisory Workshop on the Development of Guidelines for Integration of Wild Salmon Policy Biological Status Indicators (Strategy 1) and their Application to Fraser River Sockeye Salmon (*Oncorhynchus nerka*) Conservation Units

Atelier régional de consultation scientifique sur l'élaboration des Lignes directrices pour l'intégration des indicateurs d'état biologique de la Politique concernant le saumon sauvage (Stratégie 1) et leur application aux unités de conservation du saumon rouge du fleuve Fraser (*Oncorhynchus nerka*)

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Foreword

The purpose of these Proceedings is to document the activities and key discussions of the meeting. The Proceedings include research recommendations, uncertainties, and the rationale for decisions made by the meeting. Proceedings also document when data, analyses or interpretations were reviewed and rejected on scientific grounds, including the reason(s) for rejection. As such, interpretations and opinions presented in this report individually may be factually incorrect or misleading, but are included to record as faithfully as possible what was considered at the meeting. No statements are to be taken as reflecting the conclusions of the meeting unless they are clearly identified as such. Moreover, further review may result in a change of conclusions where additional information was identified as relevant to the topics being considered, but not available in the timeframe of the meeting. In the rare case when there are formal dissenting views, these are also archived as Annexes to the Proceedings.

Avant-propos

Le présent compte rendu a pour but de documenter les principales activités et discussions qui ont eu lieu au cours de la réunion. Il contient des recommandations sur les recherches à effectuer, traite des incertitudes et expose les motifs ayant mené à la prise de décisions pendant la réunion. En outre, il fait état de données, d'analyses ou d'interprétations passées en revue et rejetées pour des raisons scientifiques, en donnant la raison du rejet. Bien que les interprétations et les opinions contenues dans le présent rapport puissent être inexactes ou propres à induire en erreur, elles sont quand même reproduites aussi fidèlement que possible afin de refléter les échanges tenus au cours de la réunion. Ainsi, aucune partie de ce rapport ne doit être considérée en tant que reflet des conclusions de la réunion, à moins d'indication précise en ce sens. De plus, un examen ultérieur de la question pourrait entraîner des changements aux conclusions, notamment si l'information supplémentaire pertinente, non disponible au moment de la réunion, est fournie par la suite. Finalement, dans les rares cas où des opinions divergentes sont exprimées officiellement, celles-ci sont également consignées dans les annexes du compte rendu.

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SUMMARY

These Proceedings summarize the discussions and key conclusions that resulted from a Fisheries and Oceans Canada (DFO), Canadian Science Advisory Secretariat (CSAS) Regional Advisory meeting conducted on Nov 14-16, 2011, at the Vancouver Island Conference Centre in Nanaimo, B.C. The workshop explored approaches for integrating status information for conservation units (CU) of Pacific salmon, using 24 Fraser River Sockeye CUs as case studies.

Participants were invited based on their experience with different aspects of salmon assessment and included DFO staff from Science and Fisheries Management sectors and external participants from First Nations organizations, the commercial and recreational fishing sectors, environmental non-governmental organizations, and academia. Participants were offered a pre-workshop interview to review the data summary layout and meeting outline, and to provide feedback to organizers.

At the workshop, through a combination of small-group discussions and plenary debate, participants developed integrated status (which included one to two WSP status zones) for 22 out of the 24 Fraser Sockeye CUs, status commentaries for each CU, and documented their decision process.

These Proceedings outline the structure of the workshop and summarize general discussions related to the process. These proceedings also include the results of breakout group evaluations, the final status table developed through plenary discussion and key recommendations for future work. Note that results presented in these proceedings are a raw reproduction of the commentary developed through plenary discussion, and were not edited for style or clarity. A complete set of the materials presented at the workshop (e.g. status information by CU) and worked-up results from the workshop (e.g. status commentary for each CU) have been compiled and summarized in the Research Document associated with this Regional Peer Review meeting (Grant and Pestal 2012). Recommendations resulting from the meeting are documented the Science Advisory report resulting from the meeting (DFO 2012).

SOMMAIRE

Ce compte-rendu résume les principales discussions et conclusions qui découlent de la réunion régionale de consultation du Secrétariat canadien de consultation scientifique (SCCS) de Pêches et Océans Canada (MPO) qui s'est tenue du 14 au 16 novembre 2011 au Centre des congrès de l'île de Vancouver à Nanaimo, en Colombie-Britannique. L'atelier visait à explorer des approches pour l'intégration des renseignements sur l'état aux unités de conservation (UC) de saumon du Pacifique au moyen d'études de cas portant sur 24 UC de saumon rouge du fleuve Fraser.

Les participants ont été invités en fonction de leur expérience touchant différents aspects de l'évaluation du saumon; parmi eux se trouvaient notamment des employés des secteurs des Sciences et de la Gestion des pêches du MPO ainsi que des collaborateurs externes provenant d'organisations des Premières Nations, d'organisations non gouvernementales de l'environnement, des secteurs des pêches commerciale et récréative, et du milieu universitaire. On a offert à ces participants de prendre part à une entrevue préparatoire où ils ont pu examiner un aperçu des données et des rencontres prévues et fournir des commentaires aux organisateurs.

Pendant l'atelier, au terme de discussions en petit groupe et de débats en plénière, les participants ont déterminé un état d'intégration pour 22 des 24 UC de saumon rouge du fleuve Fraser (y compris une ou deux zones d'état selon la PSS). Ils ont également formulé des commentaires sur l'état de chaque UC et consigné par écrit leur processus décisionnel.

Ce compte rendu décrit la structure de l'atelier et résume les discussions générales résultant du processus. De plus, il contient les résultats des évaluations des groupes thématiques, le tableau final des états conçu pendant les discussions en plénière, et les principales recommandations concernant les futurs travaux. Il convient de noter que les résultats présentés dans ce compte rendu sont une reproduction brute des commentaires mis au point en plénière et n'ont pas été révisés pour des questions de style ou de clarté. Un ensemble complet du matériel présenté lors de l'atelier (p. ex., les renseignements sur l'état pour chaque UC) et de ses résultats (p. ex., commentaires sur l'état de chaque UC) a été compilé et résumé dans le document de recherche associé à cette réunion régionale d'examen par les pairs (Grant et Pestal 2012). Les recommandations résultant de la rencontre sont présentées dans l'avis scientifique créé au terme de la rencontre (MPO 2012).

INTRODUCTION

A Fisheries and Oceans Canada (DFO) Canadian Science Advisory Secretariat (CSAS), Regional Advisory Process (RAP) meeting was held on Nov 14-16, 2011, at the Vancouver Island Conference Centre in Nanaimo, B.C to develop guidelines for the integration of Wild Salmon Policy biological status indicators into up to two WSP status zones using Fraser River Sockeye salmon (*Oncorhynchus nerka*) conservation units (CUs) as case studies. In addition to decision guidelines, the objective of the workshop included the determination of final integrated statuses for each of the 24 Fraser River Sockeye CUs, and the synthesis of associated status commentaries that describe the rationale for the final status determination for each CU.

The Terms of Reference (TOR) for the science review (Appendix A) were developed in response to a request for advice from DFO's Fisheries and Aquaculture Management Branch (FAM) (see Grant et al. 2011 Appendix 6). Invitations for participation were sent to representatives with relevant expertise from First Nations, commercial and recreational fishing sectors, environmental non-governmental organizations and academia.

Participants were provided updated summaries of the status information published in Grant et al. (2011). For each CU, the information was presented as a standardized two-page summary showing the WSP metrics for abundance, long-term trend, and short-term trend, as well as supplementary information (e.g. patterns in abundance and productivity, retrospective pattern in status metrics, comparison to COSEWIC criteria for small populations, etc.) (see Appendices 1 & 2 in Grant & Pestal 2012).

Workshop preparation was extensive, and covered several rounds of review:

- A small DFO Working Group developed draft data summaries for a few case studies and tested them in an internal workshop setting with promising results.
- A broader Workshop Organizing Committee then revised the data summaries and organized the workshop as a scaled-up version of the internal test.
- Participants were invited based on their experience with different aspects of salmon assessment, and stakeholder organizations were contacted for suggestions of qualified participants.
- Preparatory interviews were offered to confirmed participants. These structured interviews were conducted by phone. During the interview, participants were asked to provide comments on the workshop structure, data summaries that participants would receive, and results templates they would work with. Key points from each interview were written up and provided to respondents for review. A total of 26 interviews were completed, covering almost all of the non-WG participants.

WORKSHOP SUMMARY

INTRODUCTIONS, LOGISTICS, AND BACKGROUND PRESENTATIONS

The meeting Chair, Marilyn Joyce, welcomed participants and provided a general overview of the CSAS process, covering the role of participants, the purpose of the various RAP publications (Science Advisory Report, Proceedings, and Research Document), and the definition and process around achieving consensus decisions and advice. Everyone was invited to participate fully in the discussion and to contribute to the goal of delivering scientifically defensible conclusions and advice.

The Chair reviewed the Terms of Reference (Appendix A) and the Agenda (Appendix B) for the meeting, highlighting the objectives and outlining the reporting process. The Chair then reviewed the ground rules and process for exchange, reminding participants that the meeting was a science review and not a consultation.

Participants were reminded that everyone at the meeting had equal standing and that they were expected to contribute actively. In total, 34 people participated in the RAP (Appendix C).

The workshop started with background presentations:

- Mark Saunders (DFO) presented an overview of WSP concepts and an update on implementation (Appendix D)
- Sue Grant (DFO) and Al Cass (DFO) presented a summary of WSP status metrics and their application to Fraser sockeye (material from Holt et al. 2009 and Grant et al. 2011)
- A quick review of the case study templates (Appendix E), status summary templates (Appendix F), and data summary layout (see Appendix 1 of Grant & Pestal 2012) was presented by Gottfried Pestal.

Following the presentations, several questions relating to the broader context for the workshop were raised and discussed among participants:

- Frequency of status assessment
- Role of this workshop within WSP implementation
- What happens with the final results (how will they be used)
- Role of the cautionary buffer in status evaluations and WSP implementation

Participants generally agreed to set aside unresolved policy questions in order to allow the workshop to proceed, but emphasized that they remained important for WSP implementation.

WORKSHOP FORMAT

The workshop was conducted as a combination of small-group discussions and plenary debate:

- Participants were divided into six groups of five to six individuals per group, chosen to provide a varied mix of views and expertise within each group
- The 24 case studies were presented in three sets over two days. Roughly half-way through each set, groups reported out on challenges they experienced in a full participant plenary session. At the end of each set, again in a full participant plenary session, groups compared results and discussed their reasoning for their final integrated statuses.
- All of the 24 CUs were evaluated by at least some of the groups, and each group evaluated a representative number of CU types (different metrics and statuses).
- The third day of the workshop was a full day of plenary discussion to reconcile group integrated status results, where possible, and to reveal CU names.

The three sets of case studies were:

- Set 1 – Exploring Diversity: six cases that illustrate the diversity of scenarios (i.e. conflicting messages from different metrics and differences in data availability).
- Set 2 – Striving for Consistency: 11 cases, broken into two roughly similar batches.

- Set 3 – Making Sense of Cycles: seven cases that have exhibited persistent cycles in abundance, creating challenges in the estimation of abundance benchmarks and the interpretation of status metrics.

Case studies were conducted "blind", with generic labels rather than CU names. Several considerations shaped the decision to use blind case studies:

- to facilitate the development of a standardized WSP status integration approach;
- to focus discussion on the metrics presented in Grant et al. (2011), and how they can be combined into an overall status evaluation;
- and to facilitate the discussion between experts with detailed local knowledge and those with broader salmonid and status evaluation experience.

BREAK OUT GROUP RESULTS

Following each breakout group session, participants were convened into a plenary discussion to present the factors each group considered in determining their CU status classifications. These presentations were then used to initiate group discussion on the rationale for status determinations and to develop consensus about a final CU status designation for each CU. During plenary sessions over the course of three day workshop, several groups revisited their initial results, and updated their integrated statuses and commentaries. This step of debating different aspects of a CU's status information was an important element of the process, and intermediate results are not documented here. Instead, the workshop was set up to facilitate learning from other groups and encourage participants to reconcile different views into a consensus commentary on the status of each CU, where possible.

Different views were captured in several distinct ways:

- group results for each CU were documented separately; if differences within a group could not be resolved, the majority view was captured as a "provisional" group result (Table 3 of Grant & Pestal 2012);
- approaches to interpretation of status-related information were compiled and written up as a resource for future processes (see section on Status Integration Approaches of Grant & Pestal 2012);
- commentary that included the interpretation of data used to develop integrated statuses were recorded for each CU (Appendix 2 of Grant & Pestal 2012).

PLENARY RESULTS

Plenary considerations and rationale for CU status classification were recorded in brevity in Tables 1 through 3 for non-cyclic and cyclic CUs. These tables were projected at the front of the workshop room so participants could view what was being recorded. Information from these recordings, from group results and workshop transcripts were rolled together to provide a final integrated status and commentary for each CU presented in Grant and Pestal (2012).

Note that Tables 1 through 3 are presented as they were at the end of workshop, without editing. The intent is to keep an exact record of the workshop discussions in this proceedings document, and have a synthesis in the Research Document (Grant and Pestal 2012).

Table 1. Group-Specific and Plenary Session Integrated Statuses for each Conservation Unit.

	Groups						Plenary		Conservation Unit Name
	1	2	3	4	5	6			
Case 1	A	A			A	A	R	A	Francois-Fraser-S
Case 2	A	A	A		A	A	A		North Barriere-ES
Case 3		A		a	A	A		A	Chilliwack-ES
Case 4									Widgeon - River
Case 5	G	G	g	g	G	G	G		Chilko-S & Chilko-ES aggregate
Case 6							Data Def		Mixed with Case 5
Case 7	A	A	A	A		a	A		Harrison (U/S)-L
Case 8									Nadina-Francois-ES
Case 9	G	G	G	G		G	G		Harrison - River
Case 10									Taseko-ES
Case 11	G	G	G	G		G	G		Harrison (D/S)-L
Case 12									Nahatlatch-ES
Case 13	A	A	a		A	a	A		Kamloops-ES
Case 14									Cultus-L
Case 15	G	G	g		G		G		Lillooet-Harrison-L
Case 16									Bowron-ES
Case 17	A	G	A		G		A	G	Pitt-ES
Case 18	a				G	G			Seton-L
Case 19	A	A	A		A	A	A		Anderson-Seton-ES
Case 20									Takla-Trembleur-EStu
Case 21					A		R	A	Quesnel-S
Case 22	G		G		G	G	G		Shuswap Complex-L
Case 23				A	G	G	A	G	Shuswap-ES
Case 24					A	A	R	A	Takla-Trembleur-Stuart-S

(Note: R = Red, A = Amber, G = Green, Upper case = strong support, lower case = provisional support within a break-out group)

Table 2. Plenary session integrated status commentaries for each non-cyclic CU (cyclic CU commentaries were recorded in Power Point during the workshop: see proceeding Table 3). Detailed status commentaries, which combine Table 2 & Table 3's information with group-specific notes and workshop transcripts are presented in Appendix 2 of Grant & Pestal 2012.

	CU Info	
	Name	Rationale
Case 1	Francois-Fraser-S	Amber (majority settled on provisional, but with dissenting views) pointing to amber: absolute abd, long-term trend, coming off a high S, early S pattern influenced by ER pointing to red: decline in R/S, RB model, Plus short term trend (but: model diagnostics might have infl)
Case 2	North Barriere-ES	Amber because decl R/S (but unr. high R/S early in ts) Amber because of current abundance relative to SR-based BM, strengthened by robustness in Abd metric across models and p-levels. However, SR-based BM seem low, and there is poor quality in SR data pre-1990 (model diagnostics!). Concerned that spawner abundance is low and decreasing even though R/S is stable to increasing in recent years. Discussion about the appropriate weight for long-term trend, given that Kalman filter picks up a productivity change.
Case 3	Chilliwack-ES	Note: no notes were put into the over-head records at the workshop
Case 4	Widgeon - River	Red because of COSEWIC D1 and long-term trend metric, but discussion whether D1 automatically trumps WSP metrics and whether recent increase is due to increased productivity or decreased ER. Additional information that would have been helpful: (1) difference between effective female spawners and viable female spawners (2) exploitation rate pattern (3) area of occupancy (4) # of populations
Case 5	Chilko-S & Chilko-ES aggregate	Green because of current abundance relative to SR-based BM, strengthened by robustness in Abd metric across models and p-levels. Discount short-term trend metric because of abd (metric,abs) and recent uptick, but need to track pattern. Red on short-term trend raises importance of assessment frequency. provisional due to decl R/S
Case 6	Mixed with Case 5	Unable to assign a status category based on available info, but recommend that some abundance index be developed, plus a proxy for ER pattern.
Case 7	Harrison (U/S)-L	Amber because current abundance relative to SR-based BM, but on border bec p-levels , but track short term trend , R/S may be biased high, pushing Sgen down , (discount SR if high R/S outliers) note that no time pattern in prod

Case 8	Nadina-Francois-ES	Red because of current abundance relative to SR-based BM, strengthened by robustness in Abd metric across models and p-levels. However, some concern that SR model fit and resulting Sgen are driven by large obs in 2000, with little other contrast in escapement (due to ER?) more model diagnostics (flag due to spike in 2000) more detail on carr cap prior -in res doc
Case 9	Harrison - River	Green because all metrics are green (but same sequence of considerations was still applied). Flag limited data for high abundance state as something to track. Contrast in SR, need R data
Case 10	Taseko-ES	Red because of long-term and short-term decline rate, based on index of abundance data (provisional because data quality is rated fair, and warrants further investigation)
Case 11	Harrison (D/S)-L	Green because of both trend metrics, but need to track whether recent decrease in abundance (despite assumed decrease in ER) continues.
Case 12	Nahatlatch-ES	Red because of absolute abd and short term trend
Case 13	Kamloops-ES	Amber because of abundance relative to SR-based BM, with focus on 50p level and stationary model (b/c no pattern in smoothed a). Confirm amber based on long-term trend, which gets more weight than short-term trend, again b/c no persistent pattern in prod. discount short-term trend b/c coming off a peak
Case 14	Cultus-L	Red because all WSP metrics are red and because of COSEWIC D1.
Case 15	Lillooet-Harrison-L	Green because of abs abd and S/R BM confirm,, look at model diagnostics, (provisional)watch decl in prods abd, but
Case 16	Bowron-ES	Red because all WSP metrics are red and because of absolute abd
Case 17	Pitt-ES	Amber/Green because of uncertainty in factor driving R/S pattern, coming off a period of high abundance, R/S below repl in last 4yrs! (hatchery influence on pop dyn is unknown

Table 3. Plenary session integrated status commentaries for each cyclic CU (non-cyclic CU commentaries were recorded in excel during the workshop: see preceding Table 2). Detailed status commentaries, which combine Table 2 & Table 3's information with group-specific notes and workshop transcripts are presented in Appendix 2 of Grant & Pestal 2012.

CU 18: | 2 | 1 | 2 | R/G | **(Seton-L)**

- ***Recent trends metric:** Red (96% prob. decline)
  (although some groups felt this was driven by single low year and overall quite stable)
  -one group focused on dominant yr trends only (Green group)
  -another group separated trends on dominant/subdominant yrs (Split Group)
- ***Productivity:** -declining trends
  -below replacement in recent yrs
- **Absolute Abundance:** -1 yr in last four below COSWIC D1
- Additional info on Larkin Kalman 'a' productivity plot requested

CU 19: | 1 | 5 **(Anderson-Seton-ES)**
1 green group driven by models changed to Amber

- ***Recent trends metric:** Red (77% prob. decline)
  -population overall increased to new high in recent yrs
  -stable abundance in recent years
- ***Productivity:** -declining trends
  -below replacement in recent yrs
- **Absolute Abundance:** 0 yrs below 1,000 in last 4yrs COSWIC D1
  -loss of cyclicity a concern for 1 group
  (may not be in cyclic groups now??)
- Additional info on Larkin Kalman 'a' productivity plot requested

CU 20: 6 **(Takla-Trembleur-EStu)**

- ***Recent trends metric:** Red (99% prob. decline)
  (declining on Dom/SubDom cycles since 1990's)
- ***Productivity:** -declining trends
  -below replacement in recent yrs
- **Absolute Abundance:** -no recent yrs below 2,500
- Additional info on Larkin Kalman 'a' productivity plot requested

CU 21: 5 1 **(Quesnel-S)**

- ***Recent trends metric:** Red (100% prob. decline)
  (declining on Dom/SubDom cycles since 1990's)
  (need further investigation of the why's)
- ***Productivity:** -long-term declining trends (but coming off peak abundance in 90's)
  -below replacement in recent yrs
- **Absolute Abundance:** -no recent yrs below 2,500
  -max. abundance over last 4 yrs much vs previous yrs
  -not high enough to compensate for severe declines
  -loss of dominant cycle
  -* group felt large absolute abundance so Amber
  (recent decline high but high current abundance)
- Additional info on Larkin Kalman 'a' productivity plot requested

Making Sense of Cycles

CU 22: 1 4 **(Shuswap-Complex-L)**

- ***Recent trends metric:** Increasing trend (46%)
  -stable abundance trends & cyclicity?
- ***Productivity:** -no systematic trends (kalman filter)
  -some low prod. in recent yrs to watch (below replacement)
- **Absolute Abundance:** -overall large numbers of spawners (dom line)
  -increase on dom. line (1 yr?—focused on arithmetic)

Red-largely linked to *Abundance* models (does this change not using them)
Comments on risk of extirpation with one dom cycle and 3 weak

Making Sense of Cycles

CU 23: 1 2 R/ **(Shuswap-ES)**

- ***Recent trends metric:** decreasing trend (-34%)
  one group felt driven by poor 2009?
  stable abundances in recent yrs?
- ***Productivity:** -increasing productivity in recent years
- **Absolute Abundance:** -1 yr in last four below COSEWIC D1

Amber due to models?

- another group separated trends on dominant/subdominant yrs (Split Group)
- Dominant doing well but can't ignore weak cycle decreasing

Making Sense of Cycles

CU 24: 2 2 Takla-Trembleur-Stuart-S

- ***Recent trends metric:** decreasing trend (-85%)
  (coming off high production)
  -all cycles decreasing
- ***Productivity:** -no systematic trends (Kalman filter)
  -some low prod. in recent yrs to watch (below replacement)
- **Absolute Abundance:** 0 yrs below 2,500 in last 4yrs COSWIC D1
- 1 Amber driven by abundance metric
- 2nd Amber driven by prolonged decline in trends in abundance (absolute abundance)

RECOMMENDATIONS & ADVICE

The first goal of the workshop outlined in the Terms of Reference was to "provide integrated status evaluations that include identification of relevant metric(s) used for the status determination for each of the 24 Fraser River Sockeye CUs". Final integrated status designations for Fraser Sockeye CUs cover all three WSP status zones, ranging from Red (poor) to Green (healthy) (Table 4 in Grant & Pestal 2012). Although single integrated statuses were not developed for all CUs, blended statuses (i.e. Red/Amber or Amber/Green) were still useful for relative CU ranking. There were two CUs where status could not be determined, either because the CU was data deficient, or due to contradictory status information that could not be resolved by workshop participants. Detailed status commentaries were also produced for each of the 24 Fraser Sockeye CUs and are documented in the associated CSAS Research Document (Appendix 2 of Grant & Pestal 2012; DFO 2012).

The second goal of the workshop was "to develop clearly documented guidelines for combining information from different status metrics". Details on status integration approaches were broadly recorded for each group, and status commentaries developed in the plenary discussion capture the key pieces of status information used by groups to designate statuses for each CU. Based on the in-depth discussions at the workshop and the case-by-case nuances in metrics used and associated commentaries on the underlying data, it is not likely that a single prescriptive algorithm for status integration under the WSP can be developed. Rather, the CSAS workshop produced a process framework for status integration, and detailed guidelines for interpreting status-related information. Both of these elements are documented in Grant & Pestal (2012).

A number of recommendations came out of the workshop documented in detail in Grant & Pestal (2012). Some larger recommendations include further work on cyclic CU benchmarks using the Larkin model and further work on time varying models for all CUs. Other recommendations included suggestions for improvements to the data summaries (provision of additional information and details).

ACKNOWLEDGEMENTS

As Chair, I would like to recognize Sue Grant and Gottfried Pestal for the leadership and vision for this CSAS workshop. The success of this workshop, and all the documentation resulting from this workshop, reflects their hard work in the planning, preparation, presentations, meeting management and writing.

Also to be acknowledged for their considerable support provided to workshop planning are the individuals on the internal DFO organizing team (alphabetical order by last name): Mike Bradford, Al Cass, Steve Cox-Rogers, Sue Grant, Jeff Grout, Ann-Marie Huang, Jim Irvine, Les Jantz, Marc Labelle, Wilf Luedke, Gottfried Pestal, Paul Ryall, Timber Whitehouse, Mark Saunders, Neil Schubert, Arlene Tompkins, and Chris Wood. This was the first CSAS workshop to tackle the challenging task of considering multiple benchmarks and metrics for Pacific Salmon and then to establish status classification for salmon Conservation Units. The workshop structure, approach and success would not have been achievable without the time the individuals on the DFO Organizing Team dedicated to many workshop-related discussions and debates. Each individual brought unique perspectives and insight to the organizing committee, which greatly assisted with fleshing out the workshop process and technical details. Al Cass, in particular, played both a key role in the organizing committee and was a key member of the facilitation team at the workshop. In addition, I also want to acknowledge Carrie Holt's considerable support on the early internal DFO workshop, and her foundational work on WSP metrics which paved the way for the current workshop. Finally, thanks also to Bronwyn MacDonald, the workshop's rapporteur, who skillfully, with great attention to detail, recorded discussions over the three day workshop.

Last, but certainly not least, we thank the workshop's participants who played a key role in both the synthesis of status information for Fraser Sockeye CUs, and the development of status integration methods for Pacific Salmon. Without their participation and dedication to the workshop process, no workshop, would there be.

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APPENDIX A: TERMS OF REFERENCE

Guidelines for Integration of Wild Salmon Policy Biological (Strategy 1) Status Indicators and Their Application to Fraser River Sockeye Conservation Units

Pacific Regional Science Advisory Process

November 14 – 16, 2011
Nanaimo BC

Chairperson: Marilyn Joyce

Context

As part of implementing Strategy 1 of Canada's Wild Salmon Policy (WSP), Canada is required to assess the biological status of WSP Conservation Units (CUs) for Pacific salmon. To meet this requirement for Fraser sockeye, this Canadian Science Advisory Secretariat (CSAS) workshop will investigate methods to integrate recently generated status information from various metrics and model assumptions.

Objectives

The workshop has two objectives:

1) Using Fraser River sockeye as a test case, develop clearly documented guidelines for combining information from different status metrics.
2) Provide integrated status evaluations that include identification of relevant metric(s) used for the status determination for each of the 24 Fraser River sockeye CUs.

Small break-out groups will work through "blind" case studies (ca. 6 groups * 16 case studies each = 4 replicate assessments for each of the 24 CUs), using summaries of the information published in Grant et al. (2011). Note that the workshop will deal exclusively with assessments of biological status under WSP Strategy 1, and will encourage the use of CSAS-accepted metrics.

Considerations for addressing these objectives:

1) How should status assessments be combined across different metrics and model assumptions?
2) How should uncertainty in abundance metrics be considered (e.g. alternative estimates of lower benchmarks)?
3) How should data quality be considered in the status evaluation?
4) How should additional information be considered in status integration?

Participants will be provided background information and case study materials in advance of the meeting. Participants will also be invited to provide initial thoughts on these 4 questions through small-group or individual interviews prior to the workshop. A summary of pre-workshop interviews will be presented on the first day.

Expected publications

CSAS Proceedings document summarizing the discussions.

CSAS Science Advisory Report on the status (Red, Amber, or Green) for 24 Fraser sockeye CUs, with accompanying rationale.

CSAS Research Documents (2), one providing a detailed record of the assembled information, status and rational for each status determination for 24 Fraser Sockeye Salmon CUs, and the second the presenting guidelines developed from this process for combining information from multiple indicators.

Participation

DFO Science Branch and Fisheries Management Branch
Province of BC
Commercial and recreational fishing interests
First Nations
Non-government organizations
Academia

References Cited

Fisheries and Oceans Canada 2005. Canada's Policy for Conservation of Wild Pacific Salmon. Fisheries and Oceans Canada, Vancouver, BC. 34 pp. http://www.pac.dfo-mpo.gc.ca/fm-gp/species-especes/salmon-saumon/wsp-pss/docs/wsp-pss-eng.pdf

Grant, S.C.H., MacDonald, B.L., Cone, T.E., Holt, C.A., Cass, A., Porszt, E.J., Hume, J.M.B. & Pon, L.B. 2011. Evaluation of uncertainty in Fraser Sockeye WSP Status using abundance and trends in abundance metrics. Can. Sci. Advis. Sec. Res. Doc 2011/087. viii + 183 pp. http://www.dfo-mpo.gc.ca/csas-sccs/Publications/ResDocs-DocRech/2011/2011_087-eng.html

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APPENDIX B: AGENDA

Chairperson: Marilyn Joyce

DAY ONE		**8:30AM – 4:30PM**
TIME	**SESSION**	**LEAD/PROCESS**
8:30 – 9:00	Registration Meet & Greet *(tea and coffee provided)*	
9:00 – 9:20	Welcome, Introductions & Housekeeping	Marilyn Joyce
9:20 – 9:40	Overview Canadian Science Advisory Secretariat (CSAS) Process	Marilyn Joyce
9:40 – 10:20	Wild Salmon Policy Primer	Mark Saunders
10:20 – 10:40	Health Break *(tea and coffee provided)*	
10:40-11:30	Fraser River Sockeye Salmon Benchmark and Status Evaluation Technical Background	Sue Grant & Al Cass
11:30 – 12:00	Workshop Process Overview	Gottfried Pestal
12:00 – 1:00	Lunch *(not provided)*	
1:00 – 2:20	Case Study Set 1 – Exploring Diversity	Break-out Groups
2:20- 2:40	Health Break	
2:40 – 3:30	Reporting Out	Group Spokesperson
3:30 - 4:15	Exploring differences & similarities in approaches	Plenary Discussion
4:15 - 4:30	Preparation for Day 2 and Wrap up	Marilyn Joyce
4:30	Adjourn	

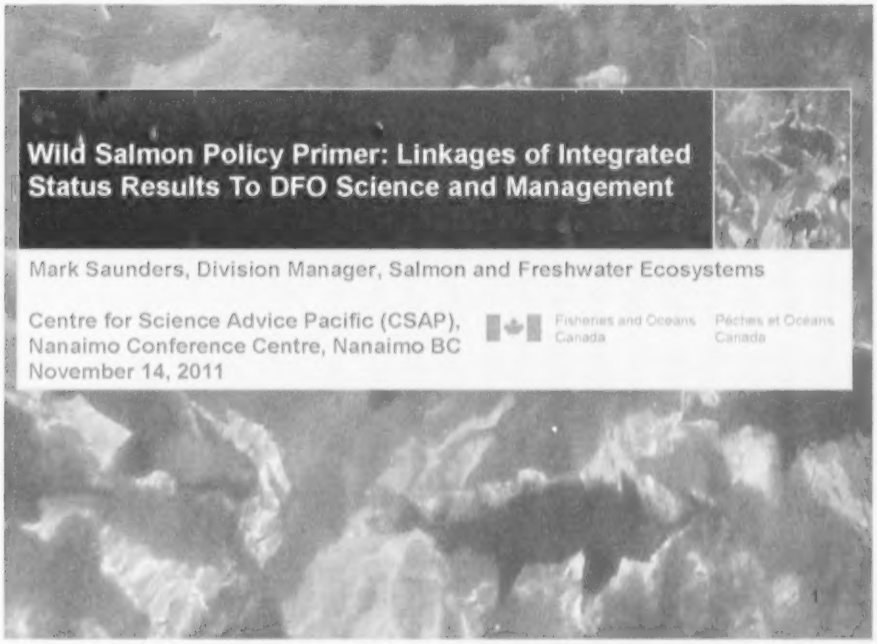
DAY 2		8:30 AM – 5:00 PM
TIME	**SESSION**	**LEAD/PROCESS**
8:30 – 9:00	Settling-in & Coffee *(tea and coffee provided)*	
9:00– 9:15	Introductions & Agenda Review	Marilyn Joyce
9:15 – 9:30	Day one Recap – Group Check-in	Marilyn Joyce
9:30 – 10:50	Case Study Set 2 – Striving for Consistency	Break-out Groups
10:50 – 11:10	Health Break *(tea and coffee provided)*	
11:10 – 12:00	Reporting Out	Group Spokesperson
12:00 – 12:30	Identifying Emerging Patterns	Plenary Discussion
12:30 – 1:30	Lunch *(not provided)*	
1:30 – 3:00	Case Study Set 3 – Making Sense of Cycles	Break out groups
3:00 – 3:20	Health Break	
3:20 – 4:00	Reporting Out	Group Spokesperson
4:00 - 4:30	Approaches for Cyclic CU's	Plenary Discussion
4:30 – 5:00	Preparation for Day 3 & Wrap Up	Marilyn Joyce
5:00	Adjourn	

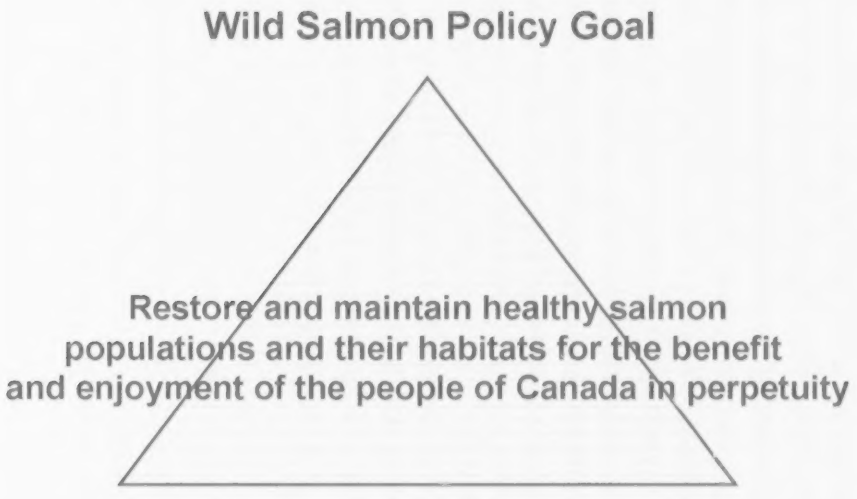
DAY 3		8:30 AM – 3:30 PM
TIME	**SESSION**	**LEAD/PROCESS**
8:30 – 9:00	Settling-in & Coffee	
9:00– 9:15	Welcome & Introductions	Marilyn Joyce
9:15 – 9:30	Day Two Recap – Group Check-in	Marilyn Joyce
9:30 – 10:30	Reconciling Case Study Status	Plenary Discussion
10:30 – 10:50	Health Break *(coffee & tea provided)*	
10:50 – 12:00	The CU Reveal – Finalizing Classifications and Rationales	Plenary Discussion
12:00 – 1:00	Lunch *(not provided)*	
1:00 – 3:00	Developing Interpretation Guidelines – Synthesizing the Logic Used	Plenary Discussion
3:00 – 3:20	Communications, Publications & Parking Lot Items	Marilyn Joyce
3:20 – 3:30	Wrap Up	Workshop Organizers
3:30	Adjourn Workshop	

APPENDIX C: PARTICIPANTS & BREAKOUT GROUPS

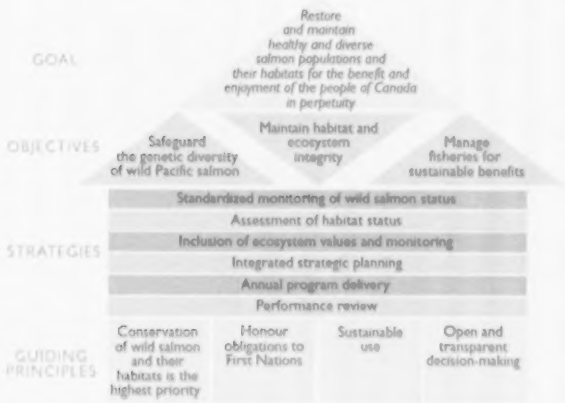
Last Name	First Name	Affiliation	Nov. 14	Nov. 15	Nov. 16	GROUP
DFO Participants						
Bailey	Richard	SA Fraser-BCI	X	X	X	3
Benner	Keri	SA Fraser-BCI	X	X	X	1
Bradford	Mike	Science SAFE	X	X	X	5
Brown	Gayle	Science SAFE SA	X	X	X	4
Cass	Alan	Science	X	X	X	6
Cone	Tracy		X	X	X	6
Decker	Scott	SA Fraser-BCI	X	X	X	5
Folkes	Michael	Science SAFE SA	X	X	X	3
Grant	Sue	SA Fraser-BCI	X	X	X	4
Grout	Jeff	FAM RHQ Salmon	X	X	X	6
Holt	Carrie	Science SAFE	X	X	X	2
Holtby	Blair	Science SAFE	X	X	X	4
Huang	Ann-Marie	FAM LFA	X	X	X	3
Irvine	James	Science SAFE	X	X	X	3
Jantz	Lester	FAM BCI	X	X	X	2
Joyce	Marilyn	Science CSAP	Workshop Chair			
Labelle	Marc		X	X	X	4
MacDonald	Bronwyn	SA Fraser-BCI	Workshop Rapporteur			
Parken	Chuck	Science SAFE SA	X	X	X	1
Porszt	Erin	Science SAFE	X	X	X	
Rosenberger	Barry		X	X	X	5
Saunders	Mark	Science SAFE	Science Leadership			
Sawada	Joel	Science SAFE SA	X	X	X	
Tadey	Joe	SA Fraser-BCI	X	X	X	2
Tompkins	Arlene	Science SAFE SA	X	X	X	2
Velez-Espino	Antonio	Science SAFE SA	X	X	X	5
Whitehouse	Timber	SA Fraser-BCI	X	X	X	5
Wood	Chris	Science MEAD				NA
External Participants						
Brunet	Elysia	SFU	X	X	X	4
Curtis	Shamus	Upper Fraser Fisheries Conservation Alliance	X	X	X	2
English	Karl	LGL Limited				NA
Harling	Wayne	Pacific Salmon Commission				3
Lapointe	Mike	Pacific Salmon Commission	X	X	X	2
MacDuffee	Misty	MCC:Raincoast Conservation	X	X	X	3
McGrath	Elinor	Okanagan Nation Alliance	X	X	X	6
Morely	Rob	Commercial Salmon Advisory Board	X	X	X	5
Pestal	Gottfried	SOLV Consulting Ltd.	X	X	X	1
Peterman	Randall	SFU	X			1
Riddell	Brian	Pacific Salmon Foundation				NA
Staley	Mike	Fraser River Aboriginal Fisheries Sec.	X	X	X	1
Taylor	Greg	Pacific Salmon Foundation	X	X	X	4

APPENDIX D: PRESENTATION (WILD SALMON POLICY PRIMER) DELIVERED BY MARK SAUNDERS


Wild Salmon Policy Primer: Linkages of Integrated Status Results To DFO Science and Management
Mark Saunders, Division Manager, Salmon and Freshwater Ecosystems
Centre for Science Advice Pacific (CSAP), Nanaimo Conference Centre, Nanaimo BC
November 14, 2011
Fisheries and Oceans Canada
Pêches et Océans Canada
1


Wild Salmon Policy Goal
Restore and maintain healthy salmon populations and their habitats for the benefit and enjoyment of the people of Canada in perpetuity
2

Overview of the Wild Salmon Policy (WSP p8)


GOAL
Restore and maintain healthy and diverse salmon populations and their habitats for the benefit and enjoyment of the people of Canada in perpetuity
OBJECTIVES
Safeguard the genetic diversity of wild Pacific salmon
Maintain habitat and ecosystem integrity
Manage fisheries for sustainable benefits
STRATEGIES
Standardized monitoring of wild salmon status
Assessment of habitat status
Inclusion of ecosystem values and monitoring
Integrated strategic planning
Annual program delivery
Performance review
GUIDING PRINCIPLES
Conservation of wild salmon and their habitats is the highest priority
Honour obligations to First Nations
Sustainable use
Open and transparent decision-making

3

Wild Salmon Policy Strategy 1: Nov 14,15,16 Workshop Focus

Biological Benchmark

- a biological benchmark against which the attributes (e.g., abundance or trends in abundance) of a conservation unit can be measured in order to determine its status;
- describes zones of biological status; **not** prescriptive for management actions;
- biological considerations only

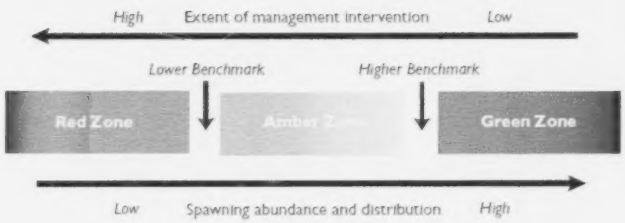
Wild Salmon Policy Strategy 4: Future (Not at this Workshop)

Management Reference Point (e.g. limit and target reference points)

- describe harvest rules (e.g., thresholds in abundances which trigger management actions);
- **link directly to** management actions;
- in addition to biological factors (strategy 1), also includes the consideration of habitat (strategy 2) and socio-economic factors.

5

"[Biological] Benchmarks identify when the biological production status has changed significantly, but do not prescribe specific restrictions"



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	Assessment Actions (WSP p19, 26, 32)	Management Action (WSP p17)	Management Drivers (WSP p17-18)
Red	"...a detailed analytical assessment will normally be triggered to examine impacts on the CU of fishing, habitat degradation, and other human factors, and evaluate restoration potential.""...'detailed stock assessments...will identify the reasons for the change in status." "CUs in the Red zone...will be identified as management priorities...the protection and restoration of these CUs will be primary drivers for harvest, habitat and enhancement planning."	"The presence of a CU in the Red zone will initiate immediate consideration of ways to protect the fish, increase their abundance and reduce the potential risk of loss."	"Biological considerations will be the primary drivers for the management of CUs with Red status"
Amber	"...a detailed analytical assessment may be required to input to Strategies 2 & 3."	"...implies caution in the management of the CU"	"Decisions about the conservation of CUs in the Amber zone will involve broader considerations of biological, social and economic issues...involves a comparison of the benefits from restoring production versus the costs arising from limitations imposed on the use of other CUs to achieve that restoration."
Green	"...a detailed analytical assessment of its biological status will not usually be needed."	(see drivers)	"Social and economic considerations will tend to be the primary drivers for the management of CUs in the Green zone, though ecosystem or other non-consumptive use values could also be considered" 8

Fraser Sockeye Integrated Statuses: S Specific Linkage to Fisheries Management

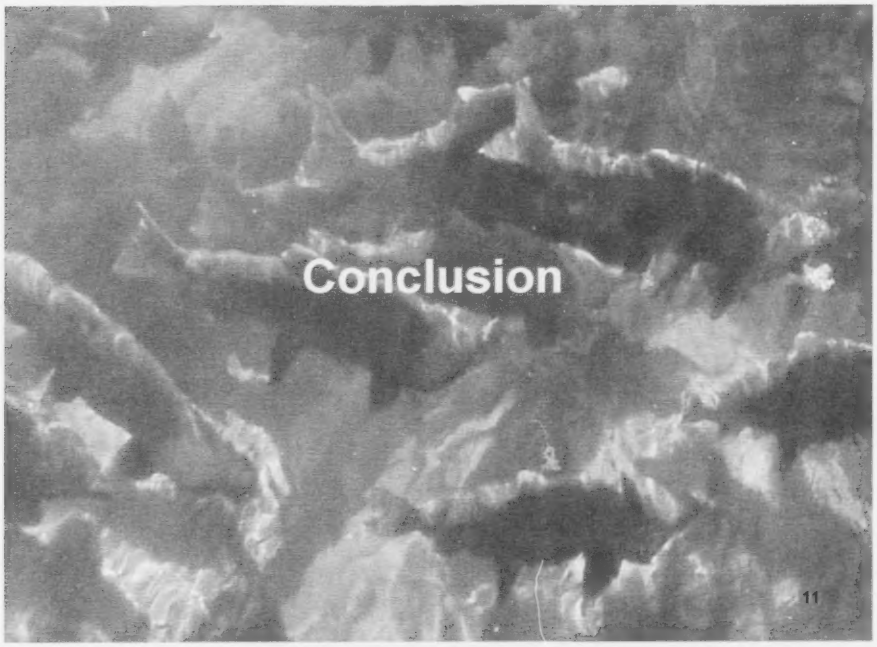
Strategy 4

Linkages to the Fraser Sockeye Spawning Initiative (FRSSI)

- currently incorporating WSP biological trends & abundance benchmarks in the evaluation of alternative escapement strategies using the FRSSI model.
- The multi-sector participant FRSSI process evaluates the outcomes of the FRSSI model using long term performance of a stock against abundance, catch, and other benchmarks to establish escapement strategies with defined management reference points.

Linkages to Marine Stewardship Council (MSC) Certification

	WSP Biological Status	DFO Synoptic Survey (Holtby in prep.)	COSEWIC/IUCN	SFU: E.Brunet's Thesis (in prep)
Goal	Detailed Pacific Salmon CU-by-CU specific assessment of WSP biological status (Red/Amber/Green)	Rapid screening of 400+ Pacific Salmon CUs using escapement data and automated implementation to assess Science priorities for all Pacific Region CUs. CUs place in numeric priority categories	**IUCN:** rapid status screen of individual subpopulations (=CUs for Fraser Sockeye) **COSEWIC:** detailed assessment of status for each DU (=FrSk CUs); **Both:** assign risk categories (data deficient, threatened, endangered, etc.) to each CU	Evaluate relative weights experts give to different WSP metrics in their assessments of an integrated status using qualitative hypothetical scenarios. (results analyzed statistically)
STATUS RELATIVE TO COSEWIC	Statuses in Amber/Green zones would not be designated at risk by COSEWIC	High tolerance for false warnings of priority CUs	NA	Same as WSP
Current Metrics	Currently may include relative abundance (or fishing mortality), trends in abundance, distribution	Absolute abundance, trends in abundance, productivity	Trends in abundance, absolute abundance, distribution	Same as WSP (all four metrics under hypothetical scenarios)
Integration	Pacific Salmon-expert driven decision guidelines and CU-specific integration including narratives for final statuses by CU	Automated and identical for all Pacific salmon CUs; a variety of algorithms explored	**IUCN:** automated; not subpopulation specific; general rules common across all CUs. **COSEWIC:** COSEWIC expert driven; general rules common across all CUs.	Similar to WSP (using broad hypothetical)


Conclusion
11

APPENDIX E: CASE STUDY TEMPLATES

Group:_____ Set:_____

Case ☐ Overall Status: _____ ☐ Consensus Assessment ☐ Provisional Assessment

Main consideration

Other considerations

Comments on group process

If provisional, main point of divergence:

APPENDIX F: STATUS SUMMARY TEMPLATES

RESULTS OF CSAP WORKSHOP ON INTEGRATING STATUS INFORMATION FOR CONSERVATION UNITS OF FRASER SOCKEY

	Groups						Plenary	CU Name	Rationale
	1	2	3	4	5	6			
Case 1									
Case 2									
Case 3									
Case 4									
Case 5									
Case 6									
Case 7									
Case 8									
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